RST310
9505A IntelliDOCK

Docking Station

Installation and
User Manual

Beam Communications Pty Ltd

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User Manual

Version 03

Beam Communications Pty Ltd

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Contents

CONTENTS **3**
SAFETY INFORMATION **5**
WELCOME **6**
CONVENTIONS IN THIS MANUAL 7
ABOUT BEAM COMMUNICATIONS **8**
IMPORTANT POWERING INFORMATION 9
WHAT IS THE RST310? **10**
RST310 OVERVIEW 11
The Front Panel *11*
The Rear Panel *11*
The RST310 Status Indicators *12*
Display Status Indicators *12*
PACKAGE CONTENTS **14**
THE RST310 PACKAGE CONTAINS: 14
OPTIONAL ACCESSORIES 14
GETTING STARTED **15**
WHAT IS A SIM CARD? 15
SIM CARD PROTECTION 15
INSTALLING/REMOVING THE SIM CARD 15
PIN DETAILS 16
INSTALLING RST310 ..... **17**
MOUNTING THE RST310 17
Mounting methods *18*
CONNECTING THE POWER CABLE 21
CONNECTING THE HANDSETS 22
CONNECTING THE LAPTOP 22
CONNECTING TO THE LOG PORT 23
CONNECTING 9505A HANDHELD CONNECTOR CABLE 23
USING THE ANTENNA ADAPTOR 24
CONNECTING THE ADAPTOR: 24
REMOVING THE ANTENNA FROM THE 9505A HANDSET 25
CONNECTING THE ANTENNA ADAPTOR 25
INSTALLING THE ANTENNA **26**
PLANNING THE ANTENNA INSTALLATION 26
INSTALLATION OPTIONS 27
BASIC OPERATION **28**
OPERATIONAL NOTES: 28
USING THE RJ-11 SOCKET & TELEPHONE **29**
RJ11 / POTS EQUIPMENT 30
VOICEMAIL 31
SHORT MESSAGE SERVICE – SMS 31
FACSIMILE SUPPORT 31
USE OF THE RST310 WITH A PABX 31
CONFIGURING THE RJ11 PORT PARAMETERS **32**
CONFIGURING SMS-POTS FEATURE **33**
CONNECTING AN SMS-POTS HANDSET 33

CONFIGURING THE RST310 FOR SMS-POTS 33
DATA SETTINGS AUTO ANSWER 34
Data Terminal settings for auto-answering an incoming data call. 34
REMOTE CONFIGURATION 35
INTELLIGENT HANDSET USE 37
INTELLIGENT HANDSET USE (OPTIONAL) 37
Connecting an Intelligent Handset 38
Symbols on the Intelligent Handset versus the 9505A 39
IN-VEHICLE HANDS FREE KIT (OPTIONAL) 40
Installation of In-vehicle Hands-free 40
ANTENNA INSTALLATION GUIDES 41
EXAMPLES 41
Maritime Installations 41
Fixed Building Installations 41
Mobile / Transport Installations 42
Heavy Machinery Installations 42
INSTALLING ANTENNA CABLES 42
PROTECTING THE ANTENNA FROM LIGHTNING 43
ASSURING QUALITY OF IRIDIUM SERVICE 44
OBSTRUCTIONS. 44
CABLING. 44
RF INTERFERENCE. 45
SYMPTOMS OF RF INTERFERENCE 46
MITIGATION OF RF INTERFERENCE 46
Recommended Operating Distances: 46
Inmarsat Mini-M 46
Inmarsat M-4 47
Inmarsat-C (CAPSAT) 47
SPECIFICATION SUMMARY 48
RS232 SPECIFICATION 49
PHYSICAL CONNECTION 49
RS232 PORT SIGNAL SUPPORT AND HANDSHAKING 49
RS232 PORT ELECTRICAL PARAMETERS 50
RF INTERFERENCE 51
SYMPTOMS OF RF INTERFERENCE 52
MITIGATION OF RF INTERFERENCE 52
Inmarsat Interference 52
Recommended Operating Distances: 53
Inmarsat Mini-M 53
Inmarsat M-4 53
Inmarsat-C (CAPSAT) 53
TROUBLESHOOTING THE RST310 54

Safety Information

Note: Read the following information before installing and using the BEAM RST310.

Your RST310 is a low power radio transmitter and receiver. When it is ON, it receives and sends out radio frequency (RF) signals.

The design of your RST310 system complies with international safety standards.

Refer to the appropriate section of the *RST310 User Manual* for additional relevant safety information.

Warning: Do not open equipment. There are no user-serviceable parts inside.
If a DC power supply is to be used, its output must comply with the Safety Extra Low Voltage (SELV) requirements of IEC60950.

All connectors except the Line and Accessory sockets must only be connected to equipment ports which comply with the Safety Extra Low Voltage (SELV) requirements of IEC60950."

Welcome

Welcome to the Beam RST310, the Intelligent Docking Station for the 9505A Handheld Iridium / Motorola handset.

This Installation and Configuration manual contains all the information you need to install and configure the Beam RST310 and discover the advantages of Beam Communications and Iridium Network technology.

The *RST310 User and Installation Manual* is for new and experienced users of wireless network systems.

Conventions in this Manual

Warnings, cautions and notes appear throughout this manual. They are represented by following conventions.

Warning: This symbol and associated text indicate a warning note providing information to prevent personal injury or damage to equipment.

Note: This symbol and associated text indicate a note providing general operating information.

Interference: All wireless phones may get interference, which could affect performance.

About BEAM Communications

Beam Communications, is an authorised manufacturer of Iridium Satellite products.

Beam develops subscriber products that utilise the Iridium satellite network of Low Earth Orbit satellites, known as LEOs. The Iridium network is extensively used around the world by commercial enterprises and defence agencies.

Beam products address the needs of individuals, communities, government agencies and the corporate sector, providing voice and data access without the need for traditional wire-line or mobile phone infrastructure.

As the Iridium satellite network is global, Beam's products address global markets, across the spectrum of rural and remote users, including households, motor vehicles, telemetry, maritime and emergency services.

Important Powering Information

Powering up the RST310A Terminal

1. Turn off power to the terminal.
2. Ensure that all the cables are connected to the 9505A handset as shown below

3. Turn off the 9505A phone (if not already off).
4. Turn on power to the terminal. The 9505A phone will automatically turn on.
5. Please wait for up to 60 seconds for the phone to register.

You are now ready to make calls using either standard phone equipment connected to the RJ11 sockets or the Intelligent handset if installed to the terminal.

What is the RST310?

The RST310 is a Remote Satellite Terminal docking station for the Motorola and Iridium 9505A Handheld Satellite Telephones. Once the handset is docked in the Intelligent Docking Station it provides a reliable and cost effective telephone or data service connection when a wired connection is not available.

The RST310 uses the Iridium handheld satellite telephone transceiver to gain access to the Iridium network The RST310 allows the connection of standard telephone handsets and other telecommunications devices.

The RST310 emulates the functionality of the Public Switched Telephone Network (PSTN). It includes two wire voice connections, a Hayes compatible modem, providing a serial socket for a computer, a socket for the connection of a plug-pack type mains power supply and a connection to an external antenna.

The RST310 provides a serial control interface and audio input and outputs by way of the transceiver's control and connection interface.

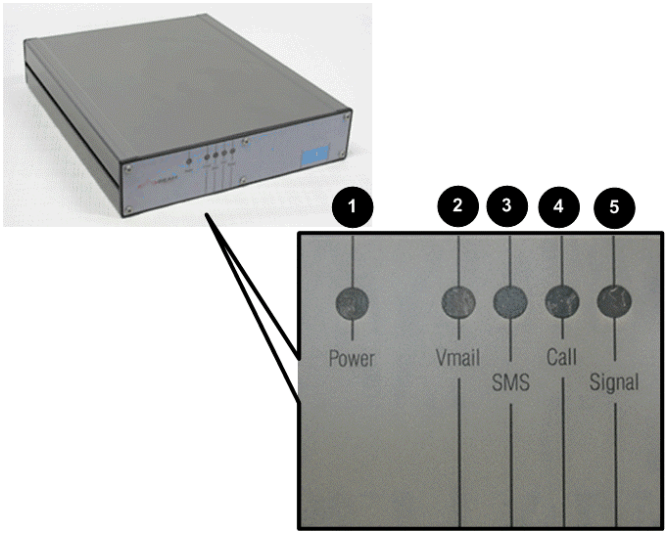
In addition, the RST310 incorporates a signal strength indication to assist in implementation and in-call performance.

The RST310 from Beam Communications brings you all the convenience and ease of use of a normal wired telephone anywhere in the world using the Iridium Satellite phone system. It also brings you a data connection and SMS access without having to buy a modem. It is all included in the RST310.

RST310 Overview

The Front Panel

Figure 1 - The RST310 front panel



Status LEDS

1. Power
2. Voicemail waiting*
3. SMS waiting
4. Call status
5. Signal strength

* Subject to network availability

The Rear Panel

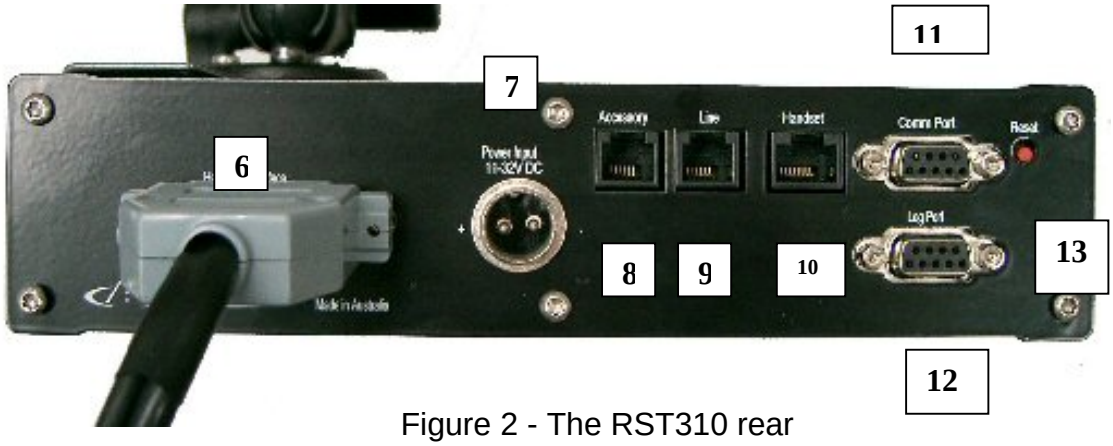


Figure 2 - The RST310 rear panel

Rear Connectors

6. 9505A Connection
7. 11-32V DC Power Input
8. RJ11 / POTS Output (Accessory / External ringer)
9. RJ11 / POTS Output (Main)
10. Intelligent Handset or In-Vehicle Accessory connection
11. Comm Port for data connectivity
12. Log Port : Beam Terminal Configuration
13. Reset Button: Power Cycles unit

The RST310 Status Indicators

The status indicators are located on the front panel of the RST310. The LED lights on the front panel show the RST310 status.

Note: The LED lights will blink in different combinations to indicate transmission such things as transmission status, signal strength and power.

Display Status Indicators

Power

When the RST310 powers up, the Power indicator flashes while it carries out internal self-diagnosis, and then goes steady green and remains lit while power is applied to the RST310.

If the Power indicator does not illuminate at all when you switch on the RST310, check the power supply to the RST310.

If the Power indicator flashes rather than illuminates continuously after a few seconds, the RST310 may require service. Contact your service provider.

Voicemail Waiting

The Voicemail Waiting LED flashes to indicate new message(s) are waiting in your voice mailbox (subject to network support, not available from all providers).

SMS Waiting

The SMS Waiting LED flashes to indicate an SMS message is waiting.

Call Status

The Call Status indicator indicates the status of the call. The Call status indicates:

- In Call
- Waiting to connect
- Incoming call

Signal Strength

The Signal Strength LED gives an indication of how strong the signal is from the Iridium network at your location. This LED displays different colours to indicate the strength of the RF (Radio Frequency) signal and different on/off conditions to indicate the terminal status.

Indictor colour	Signal strength
Flashing	RST310 is registering with the network – please wait
Green	Strong
Orange	Acceptable
Red	No signal, problem with installation

The Signal Strength LED reading will vary in status in relation to the quality of the Signal being received by the terminal. There are many factors that will affect the signal strength including, local RF interference, poor antenna cabling or exceeding the 3DB loss limit, poor line of sight or other environmental conditions affecting signal penetration to the antenna system.

Package Contents

The RST310 package contains:

- 1 RST310 unit
- 1 universal plug-pack power adapter, 110-240V AC
- 1 9-pin-to-9-pin RS-232 cable (Male to Female)
- 1 user manual in hard copy
- Ram Mount Bracket
- 9505A handheld connector Cables
- Mounting Brackets
- Mounting Bracket Screws
- 1 CD including; AT command set, installation guide, user guide and intelligent handset manual

Optional Accessories

Alert / Monitoring Interface

Battery Backup Sub-System

In-vehicle Hands-free kit

Intelligent handset (uses RJ45 port)

Cable Kit

Antenna

External Ringer

See your Service Provider for pricing and availability of these optional accessories

Getting Started

What is a SIM Card?

A SIM Card (Subscriber Identity Module) is a small smart card that carries your identity for accessing the network and receiving calls. It functions as the digital memory of the RST310 and also stores your personal information, including received SMS messages.

SIM Card Protection

Scratching or bending the SIM card can easily damage the card or its metal contacts. Handle the SIM card with care. Avoid exposing the card to static electricity, water or dirt.

Installing/Removing the SIM Card

The SIM card is stored in the SIM card compartment of the 9505A Satellite handset. Refer to the 9505A user manual for instructions on inserting the SIM card.

.

Warning: Make sure the RST310 is switched off or disconnected from the handset before you insert or remove the SIM card from the handheld terminal. If you do not, the memory on your SIM card and or the SIM card itself may be damaged.

PIN Details

The RST has a number of different PINs, each one to perform or limit certain functions. The table below identifies these PINS, their function and a place for you to note the setting for your unit.

PIN Name	Function	Indication that entry of PIN is required	Your PIN
SIM PIN Supplied by your Service Provider	Enables calls to be made if SIM is locked	Signal light flashes Red	
PUK Supplied by your Service Provider	Unlocks a locked SIM card	Signal light flashes Red	
User PIN Supplied with this manual	Allows access to user menu of RST310 via log port	Enter PIN on console	9876 Default
Supervisor PIN Supplied with this manual	Allows access to supervisor menu of RST310 via log port	Enter PIN on console	3170 Default

Installing RST310

This chapter explains how to install the RST310 and the Iridium fixed-mast antenna.

Warning: Make sure the RST310 is switched off before you install the cables. If you do not, the RST310 may be damaged.

Note: Before you install the RST310, determine if the unit is preconfigured or needs customer configuration.

Mounting the RST310

The RST310 comes with two (2) standard right angle mounting brackets that allow mounting for mobile and fixed positioning.

Note: To ensure sturdy mount attachment:

1. Mount the RST310 on a clean, even surface.
2. Clean the mount surface of the RST310.
3. Use the correct type of screws.
4. If mounting on a wooden surface, make sure the wood is structurally sound.
5. Leave enough room around the RST310 to allow unhindered access to the rear panel.
6. Do not install the unit in a permanently concealed recess. You should be able to access and remove the unit should future service be required.

Mounting methods

The mounting brackets allow two mounting methods: drop-in (inside corner) mount and flush (outside corner) mount.

Figure 3 - Mounting methods

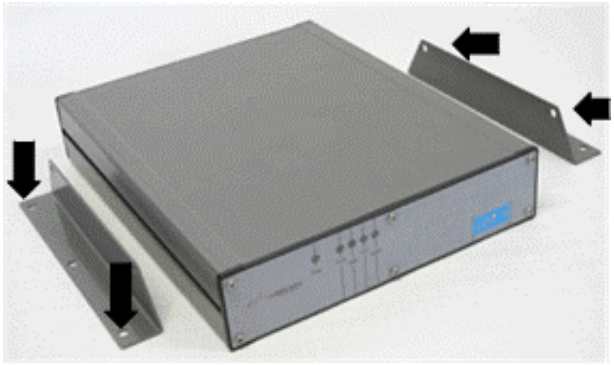
To install the RST310 unit:

There are two options for affixing the docking station to a fixed location.

Option 1,

The main terminal can be mounted with the Ram-mount phone holder in a separate location or on a separate mounting structure.

1. Attach the two (2) mounting brackets securely to a suitable structure making sure the space between the brackets is wide enough to smoothly slot in the RST310.



2. Secure the RST310 unit to the mounting brackets using supplied screws.

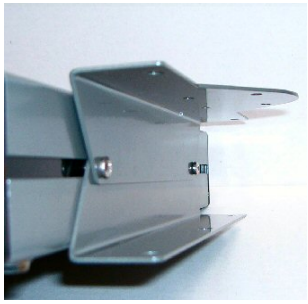
3. Carefully slot the RST310 between the two mounting brackets and secure with the retaining screws.
4. Mount the Ram-mount cradle for the 9505A in the desired location ensuring that there is sufficient cable length for the handset to connect to the main terminal.

Option 2,

Using the brackets supplied the Ram-mount handset holder can be firmly attached to the terminal as pictured below, follow the above instructions for mounting the terminal, however using the longer mounting screws supplied affix the additional ram-mount holding bracket to the side of the unit.

Connect the right angled bracket to the main terminal as pictured below

Ram Mount Connector Bracket



Attach as shown

Attach Ram-Mount base as shown

Attach Ram-mount Holder

Connecting the Power Cable

1. Make sure the AC power switch supplying the RST310 power pack is off.
2. Plug in the power cable into the power jack located on the rear panel of the RST310.

3. Secure the cable by tightening the plug retainer.

Connecting the handsets

1. Plug the telephone, answering machine or corded/cordless phone into the Line and or Accessory Socket RJ11. It is important to note that Facsimile Messaging is not supported on the Iridium Network via a standard RJ11 connection.

2. Plug the optional Intelligent Handset into the Handset Socket, RJ45. Note this is only for the Beam RST970 Intelligent Handset **ONLY**

Connecting the Laptop

1. Plug the laptop cable into the Comm.'s port of the RST310.

Connecting to the Log Port

1. Connect the laptop to the Log port. The Log port should only be used for configuration and control of the terminal equipment. The LOG port can not be used for Communications or Data Services

.

2. The LOG Port can also be used when using a Beam Alert/Monitoring Device, refer to the instruction provided with the accessory device for configuration and installation.

Connecting 9505A Handheld Connector Cable

1. Connect the supplied connector cable to the 25pin socket on the rear of the RST310 main terminal.

2. Ensure that the cable can reach to be easily connected to the base of the handset as required.

Using the antenna adaptor

The Antenna adaptor is required to be used in conjunction with the RST310 IntelliDock unit. The antenna adaptor should have been supplied with your 9505A handset when purchased.

The Antenna adaptor allows for an external antenna to be used in conjunction with the 9505A handset, which is mandatory for a fixed installation.

To attach the antenna adaptor follow these steps

Connecting the adaptor:

1. Connect the adaptor to the antenna cable. The cable should be fitted with a TNC type connector for easy of connection.

Removing the Antenna from the 9505A handset

1. *Ensure the antenna is facing down and completely retracted*
2. *Holding the 9505A handheld firmly, press down on the antenna release button as shown.*
3. *Whilst holding down the release button firmly, remove the antenna from the connection gently.*

Connecting the antenna adaptor

1. *In the same way the antenna was removed, follow the reverse sequence to reconnect the antenna adaptor. Ensure that the antenna adaptor "clicks" into place in either of the 45° angles:*

CORRECT ORIENTATION OF ADAPTOR **WRONG ORIENTATION**

2. *Ensure that the antenna cable is fixed with proper strain relief, so that there is no stress on the adaptor or the phone antenna connector.*

NOTE: If the phone displays: "Rotate and Extend Antenna", then the adaptor is not properly aligned and clicked into the 45° angle. Please re-adjust adaptor.

	Note: Be careful to ensure that when you are removing or installing the antenna or adaptor that the handsets power is turned off. The handset should not be turned on until after the connector cable is attached also.

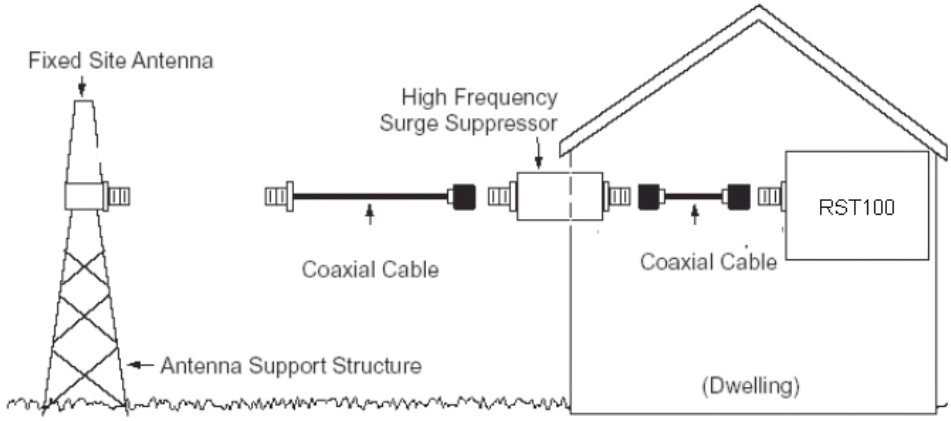
Installing the Antenna

Planning the Antenna Installation

The fixed site antenna system consists of a fixed mount antenna and a coaxial cable system that connects the antenna to the RST310.

The antenna system is suitable for both marine and terrestrial applications and is designed to meet Iridium System performance requirements when installed according to the instructions in this guide.

The following figure shows a typical terrestrial application:



The Fixed Site Antenna is an antenna contained within a weatherproof housing. It is intended to be mast-mounted without any type of ground plane. For proper performance in the Iridium System:

- The antenna must have a clear line to the sky from the horizon up
- Mount the antenna vertically
- Position the antenna so that it is reasonably clear of nearby metal obstructions
- Minimize horizontal obstructions as much as possible because they can create areas of poor system coverage. These areas of poor coverage can decrease or possibly eliminate the user's ability to operate the RST310 with predictability.

A specialised coaxial cable system is required to connect the Fixed Mast Antenna and RST310. This cable system is offered as an option to the Fixed Site Antenna.

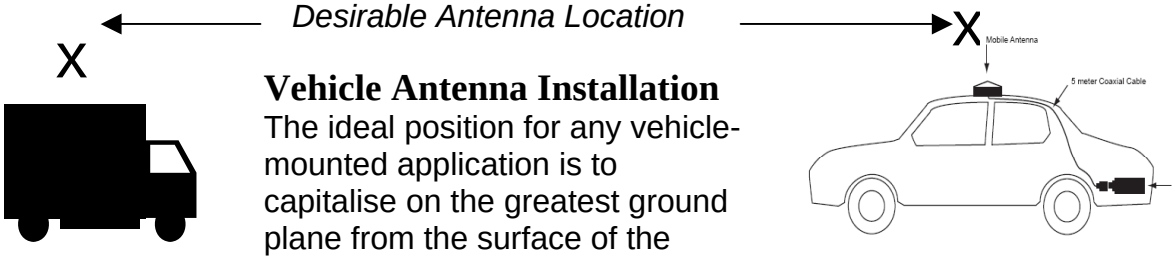
To minimize the loss of radio signal from the antenna to the RST310, the coaxial cable system between the antenna and the other component should be less than 3dB including connector loss.

Installation Options

The fixed site antenna system consists of a fixed mount antenna and a coaxial cable system that connects the antenna to the Satellite Terminal Equipment. Ensure that the antenna cable being used does not exceed 3DB loss.

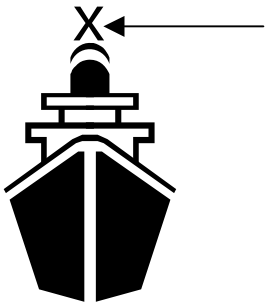
The antenna system is suitable for marine, vehicle and fixed applications and is designed to meet Iridium System performance requirements when installed according to the instructions in this guide.

The following figure shows typical Installations:



Vehicle Antenna Installation

The ideal position for any vehicle-mounted application is to capitalise on the greatest ground plane from the surface of the vehicle.



Marine Antenna Installation

In the case of a marine installation, the antenna should me installed without obstruction of other instruments or structures.
The antenna should not be positioned within range of radar equipment or other RF interference.

Refer to the Antenna Installation Guide for more information at the rear of this manual.

Basic Operation

Powering up the terminal

6. Turn off power to the terminal.
7. Ensure that all the cables are connected to the 9505A handset as shown below
8. Turn off the 9505A phone (if not already off).
9. Turn on power to the terminal. The 9505A phone will automatically turn on.
10. Please wait for up to 60 seconds for the phone to register.
11. You are now ready to make calls using either standard phone equipment connected to the RJ11 sockets or the Intelligent handset if installed to the terminal.

Operational Notes:

1. The 9505A battery will charge from the main power source of the IntelliDOCK to ensure that it is always charged and ready for use out of the docking station.
2. Care should always be taken when connecting and disconnecting cables in order to not damage the connectors or the cables.
3. To remove the 9505A phone for portable use, please turn off power to the terminal. If required, also press the 9505A power button to turn phone off.

Using the RJ-11 Socket & Telephone

To make a phone call:

*PIN controlled access***:**

Your 9505A handheld phone may have been set-up to require a PIN, if this is still active on your handheld terminal this will be indicated by the Signal light flashing Red and a distinctive dial tone consisting of two alternating tones on the RST310 terminal. If a normal dial tone is heard, proceed to dial your desired number as described below.

If a distinctive, two-tone dial tone is heard, one of two access codes is required – the SIM PIN or the PIN Unlock Code (PUK).

- The SIM PIN is required if the two tones are of equal length. If so simply enter the four digit PIN and await a change of tone (up to ten seconds), then hang up. If the PIN was correct the phone will register and you may proceed with normal use as described below.

- The PUK is required if the PIN has been incorrectly entered three times and is indicated when the high tone is longer than the low tone. Enter the PUK code, await a change of tone (up to ten seconds) and hang up. If the PUK was correct the phone will register and you may proceed with normal use as described below. The SIM card will be permanently disabled if an incorrect PUK is entered 10 times in a row. Note that in future the PIN to be entered is now that of the USER PIN programmed for the log port of the RST310. The original PIN on the SIM has been erased by entry of the PUK.

Once powered up, the RST310 attempts to register with the Iridium network. The signal level LED uses colour to indicate how strong the Iridium signal is at your location.

Indicator colour	Signal strength
Green	Strong
Orange	Acceptable
Red	No signal, problem with installation

In most cases the indicator will show green after a short period of approximately 15 seconds – orange indicates an acceptable but marginal signal strength. If the indicator remains red, there is a problem with the installation.

2. You are now ready to make a call.

You should hear a dial tone when you lift your DTMF telephone handset. The call status indicator should also shine orange continuously.

If you hear nothing, there is possibly something wrong with your telephone or cable.

If you hear an unavailable tone, normally a single tone interrupted every few seconds by silence, check that the signal strength indicator is orange or green. If so, there may be a problem with your SIM card.

If you hear a dial tone, make a call just as you normally would use a phone, noting any dialling prefix instructions advised by your service provider. Once you have entered the phone number you will hear progress pips from the Iridium network. It can take up to 30 seconds for the Iridium network to connect a call, so a pause at this stage is not unusual.

Eventually you will hear the other end ringing, or hear a busy tone and voice message indicating why your call was unsuccessful. When the other party answers the call status indicator will change from steady orange to flashing orange, indicating a call in progress.

3. To terminate the call just hang up the handset. The call status light turns off.

RJ11 / POTS Equipment

The RST310 supports multiple variations of standard telephone equipment, including standard corded, cordless, multiple handset cordless, answering machines, and other external ringing devices.

The line supports a telecommunication standard of 3ren, which allows it to support multiple extension of the line.

The RST310 also supports long cable runs off the RJ11 socket. This provides flexibility for installation as well as running long line distances from power in remote environments.

As a rule of thumb the RST310 will support most standard RJ11 equipment that can be purchased in most countries. It is always however advisable to purchase equipment that is endorsed or certified by the authorities in your country or the major telephone company.

Voicemail

If a Voicemail message has been left for you, the RST310 flashes the Voicemail Waiting indicator (subject to network support). The indicator is cleared whenever the user connects to the Voicemail retrieval number programmed in the RST310.

Short Message Service – SMS

If an SMS has been sent to the user, the RST310 flashes the SMS Waiting indicator. This means that the SMS is ready to be read. The indicator is cleared when the SMS has been read and cleared from the RST memory.

See the section *Connecting a PC* for details of how to connect a PC to the RST to read and send SMS messages.

Facsimile Support

The Iridium network does not support facsimile transmission.

Use of the RST310 with a PABX

The RST310 RJ11 port presents as an FXS line, that is it looks like an exchange or central office line to a standard DTMF telephone attached to the RJ11 analog port.

If instead of a standard telephone, a PABX is connected, then the RST310 is performing the role of the network trunk as shown below:

Call Progress	FXS
Initiate incoming call	Sends ring to PBX
Call Progress state	Indicated by configured service tones
Detects outgoing call from PBX	Detects off-hook from PBX
Progress state	Sends dial tone to PBX
Signaling in-call	DTMF
Detect disconnect	Detects on-hook from PBX

The RJ11 port of the RST310 is set to a default setting, which is intended to operate out-of-the-box with most phones and PABXs available. This default setting is known as “International Default” within the Beam Management System.

The International Default sets the line impedance to 600 Ohms and the levels in the up and downlink directions to suit the expected deployment scenarios. Specific implementations and terminal equipment may require adjustment of these parameters in association with your Service Provider.

Configuring the RJ11 port parameters

The ability to configure the RJ11 port parameters is one of the major features of the Beam RST310.

The parameters of the port are configured using the Beam Management System “BMS”.

The BMS allows the configuration of:

- Dialed number processing (to support crew calling and specialized applications)
- Line settings such as dial tone frequency and sound (in order to make the RST310 sound like any other phone in the network)
- Gain settings (to allow optimization for short and long copper tails up to 500m)
- Impedance (to accommodate a large range of terminals equipment including PABXs)

This ability to adapt the RST310 to particular applications opens up new areas of use in crew calling, rural community centers, SOHO use and Universal Service Obligation activities.

The RST310 is designed to support multiple phones in parallel, and can operate with many common calling card platforms allowing the creation of specific solutions to address specific needs.

The configuration of the RJ11 interface is covered in the RST310 Configuration Manual, a companion to this document.

Configuring SMS-POTS Feature

The RST310 will support the use of an SMS-POTS handset. The SMS-POTS functionality supports the use of SMS messaging over the Iridium network without the need to use one of the Intelligent type handsets or a Computer to send, receive SMS messages.

Using a POTS-SMS telephone handset it is possible to initiate an SMS message and send it to another Iridium user, or to another cellular user (Selected Providers Only).

It is not advisable to use an Intelligent handset in conjunction with an SMS-POTS handset as the Intelligent handset and the SMS-POTS terminal cannot both receive the SMS messages.

The major benefit of the SMS-POTS feature is that it will allow you to run the handset away from the terminal over long distances whilst still supporting SMS. Typically the Intelligent type handsets are limited to less than 10m/30’ whereas the SMS-POTS being on the RJ11 line will support 100’s metres / 1000’s feet.

The parameters of the port are configured using the Beam Management System “BMS”.

Connecting an SMS-POTS handset

An SMS_POTS handset can be easily connected to the RST310 terminal via the RJ11 POTS connection. Once connected the setting within the RST310 should be configured to ensure compatibility with the handset as well as enabling the SMS-POTS feature.

Configuring the RST310 for SMS-POTS

Using the Beam Management System the RST310 terminal should be configured to enable the SMS-POTS feature. Consult the Configuration Manual, Available on the CD supplied with the terminal, for details on configuring the SMS-POTS service.

Data Settings Auto Answer

Data Terminal settings for auto-answering an incoming data call.

To initialize the RST310 to receive an incoming data call, start a Terminal Program (such as HyperTerminal) with the following settings: 19200* bps, 8, N, 1, Flow Control = None. Then to enable the RST310 to auto answer, type the following AT commands to the RST310:

ATS0=1 (This turns on auto-answer)
AT+IPR=x (where x baud of Terminal Program, according to
1 = 600 bps
2 = 1200 bps
3 = 2400 bps
4 = 4800 bps
5 = 9600 bps
6 = 19200 bps (default)
E.g. AT+IPR=5 sets to 9600bps Terminal rate)
AT&W0 (This stores the current (active) settings to Profile 0 of the RST310).

The RST310 is now ready to answer an incoming data call automatically, as long as the Terminal Program is connected and running. During the waiting period, the Activity timeout can expire, and Voice calls can be made.

* The baud rate can be set to whatever baud rate the device answering the call is going to need and not necessarily 19.2k. The “RING” string should be decipherable by the target device/program.

Remote Configuration

The Supervisor Menu items are available for remote configuration via a combination of the Iridium Short Burst Data and or SMS services. Refer to your Service Provider on how to register for this service.

To configure your RST remotely you will need to know its Phone Number, Supervisor PIN and the International Mobile Equipment Identifier (IMEI) number.

Multiple configuration commands may be sent in one SMS. The Supervisor PIN is only required once at the start. Once the PIN has been entered the top of hierarchy for each subsequent command in the message is the Supervisor menu.

The menu text is suppressed from the reply, but otherwise you enter digits in your command exactly as you would enter them if you were on a directly connected terminal.

The replies to all your commands come back in one SBD email attachment, or in an SMS. The original entered command is echoed back so you can see what each reply is for.

Example Command:

To set the Ringer Frequency remotely to 20Hz, send an SMS to the phone number of the Terminal containing RST RMT 3170 4120

Explanation:

RST RMT is the start of command message flag

(can also be *RST SMS <reply number>* if SBD is not enabled on service)

3170 is the default Supervisor PIN.

‘4’ selects the tone menu, ‘1’ selects ring frequency and ‘20’ Hz is the new ring frequency required.

The automatic confirmation reply returned via email will contain:

```
From: <Iridium SBD Service (Tempe, AZ)>
Sent: Tuesday, August 13, 2002 12:49 PM
Subject: SBD Msg From Unit: 304050607080903


MOMSN: 23
Time of Session (UTC): Tue Aug 13 16:51:04 2002
Session Status: TRANSFER OK
Message Size (bytes): 351

Unit Location: Lat = 59.372463 Long = 75.309806
CEPradius = 3

Message is Attached.
```

The attached .sbd file returned will contain:

3170 OK
Confirms PIN OK41 25 OK

(Advises content of parameter before the change is effected)

Multiple commands can be sent in a single SMS e.g.: RST RMT 3170 4120 64 would retrieve the above information plus send a current phone number-processing summary.

Intelligent Handset Use

Intelligent Handset Use (optional)

The RST310 is capable of supporting voice services on the Iridium network through the use of an appropriate Intelligent handset that is available as an optional item. The Intelligent handset enables you to access Voice and SMS services over the Iridium network in conjunction with the RST310 terminal interface.

Note 1: Only the RST971 Intelligent handset is compatible with the RST310, which is a variant of the normal DPL Iridium Intelligent Handset.

Note 2: It is not possible to use an Intelligent handset and the POTS/RJ11 socket simultaneously. As the Audio output connector of the 9505A does not allow audio to travel to the POTS-RJ11 terminal.

Note 3: The Ringer level on the DPL handset is more quiet than usual, when used on the RST310, as the actual ring volume from the 9505A head-phone port is at a normal voice (quieter) level.

Note 4: The symbols on the RST971 Intelligent handset LCD do not align accordingly to the 9505A symbols. Please refer to “Symbols on the Intelligent Handset versus the 9505A” table.

Connecting an Intelligent Handset

The Intelligent handset is easily connected to the RJ45 socket located on the RST310 Voice Data module.

The unit must be powered off, with the 9505A phone off before inserting the connector and then apply power to the Terminal. Both the 9505A and Intelligent Handset will then power on automatically.

An extension cable to the Intelligent handset can be sourced and used if required.

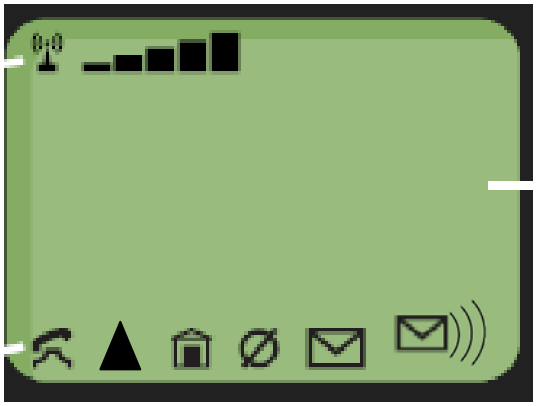
Symbols on the Intelligent Handset versus the 9505A

Please note that all the symbols do not correspond, and use the following table to interpret what is being indicated on the Intelligent Handset:

Symbol	9505A	Intelligent Handset
12:00	12:00	12:00
	Not Used	Not Used

9505A Display

Intelligent Handset (DPL)



In-vehicle Hands free Kit (Optional)

The 9505A Handheld is capable of supporting the Beam RST978 optional In-vehicle hands-free kit to provide in vehicle hands-free operation within a vehicle.

The In-vehicle hands free kit is supplied with and Intelligent Handset as well as a full in-vehicle integration. The in-vehicle integration supports ringer alert and other specific vehicle features if required such as horn alert and radio mute.

Installation of In-vehicle Hands-free

The RST978 optional in-vehicle hands free kit is simply connected to the 9505A A handheld terminal.

The installation will need to be carried out by an auto electrician.

Antenna Installation Guides

The following example will provide guidance for antenna installation techniques for specific applications. Proper antenna installation is critical for the successful operation of your Beam terminal equipment.

Whilst it is not always possible to gain clear line of sight to the horizon in all situation due to poor access or environmental conditions, every effort should be made to achieve maximum visibility at all times.

As there is a wide range of antenna options available it is always best to talk with your Service Provider about the most appropriate antenna installation for your application.

Examples

Maritime Installations

Fixed Building Installations

Mobile / Transport Installations

Heavy Machinery Installations

Installing Antenna Cables

When you install the cables, follow these guidelines:

- Route and restrain cables to prevent them from vibrating or moving under normal conditions, which could result in damage to the antenna, Beam terminal, or the coaxial cable connections.
- Wherever the cables contact structures, protect the cables from chafing or abrasion. When you must bend a cable, avoid kinking it, and ensure that each bend radius follows the cable supplier's recommended limits.
- Use coaxial sealant, shrink-wrap tubing, electrical tape, or another suitable product to seal all cable connections appropriately to prevent moisture and corrosion damage from weather exposure.
- Connectors should be tightened as shown below in the absence of manufacturer advice specific to your cable:
- Use only specified cables for the Iridium network as supplied by Beam or refer to the specification table below.

Protecting the Antenna from Lightning

Antennas mounted in fixed installations can be exposed to lightning strikes in certain geographical and climatological environments. It is not possible to protect the RST600, the antenna, or surrounding and/or connected equipment or structures from damage from a direct lightning strike.

Incorporating specialized lightning arrestor/surge suppression components into the antenna system should provide additional protection. Install this suppressor at either of the following locations:

- Nearest the point at which the coaxial cable enters a building structure
- Where the cable first passes close to a grounded structure

Make the connections to the suppressor according to the installation instructions supplied by the suppressor manufacturer.

If you use antenna cables from an alternate source, you must still consider incorporating a device into the antenna cable system to provide protection from lightning strikes and power surges. If you are uncertain about selecting an appropriate method for protection against lightning strikes and power surges, employ the services of a professional antenna installer.

Assuring Quality of Iridium Service

Iridium is committed to providing users around the world consistent, reliable, quality voice and data access all day every day. The Iridium satellite system is monitored for call performance from numerous locations 24 hours a day, 7 days a week in order to achieve this.

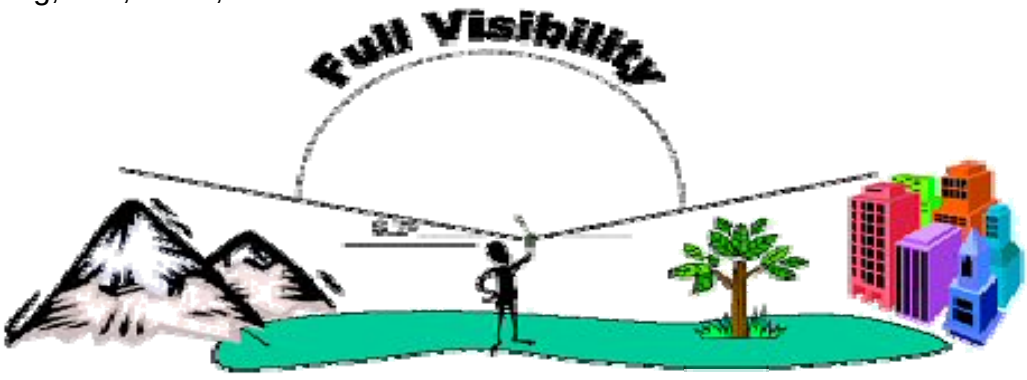
Iridium continually strives to provide high quality voice and data communication links for its subscribers. However, there are conditions that can compromise the quality of the service you may receive.

There are three common factors regarding the user's environment that can lead to degraded service quality. Obstructions, Cabling and Interference

Obstructions.

For best performance, the user’s antenna must be able to “see” the entire sky from approximately 8 degrees above the horizon. Nearby tall buildings or similar structures, heavily leafed trees, mountains, etc. can degrade performance as they block the signal between the equipment’s antenna and the satellites. Having a completely open view of the sky plays a very important role in maximizing performance, as the Iridium satellites cross the sky from horizon to horizon during a call connection.

A good rule of thumb is that all surrounding obstructions should be lower than the top of a fist which is extended at arms length and the bottom of the fist placed on the horizon. Note that Iridium performance is immune from natural environments such as clouds, fog, rain, snow, wind and smoke.



Cabling.

Using an externally (outside) mounted antenna provides an ideal solution for many applications. If you have or plan to install an external antenna, note that it is very important that the cables used for these installations must meet the guidelines that Iridium has established for proper performance.

For optimal performance, we recommend using the shortest length of cable and the fewest number of connectors possible.

The following table should be used as a guide in selecting the appropriate cabling, if you have not already purchased a certified cable from Beam.

Times Microwave™ Cable Type	Loss (dB/m)	Max Length (m)	Max Length (ft.)
LMR® 240	0.337319	4.5	14.7
LMR® 400*	**0.175363**	**8.5**	**28**
LMR® 600	0.113623	13.2	44
LMR® 900	0.076893	19.7	65
LMR® 1200	0.057872	26.2	86
LMR® 1700	0.043461	35	115
1.625" LDF	0.036037	42	138.3
2.25" LDF	0.030260	50.2	164.7

RF Interference.

All wireless devices, including satellite telephones, are susceptible to RF (radio frequency) interference from other electronic devices. This problem is especially evident when numerous antennas and broadcasting devices are located within close proximity to each other.

A good example would be onboard a ship. It is important that certain considerations be taken into account for best performance when an Iridium system is installed.
Causes of RF Interference
Some subscribers have contacted Iridium regarding the loss of signal quality when they operate their equipment near active INMARSAT terminals. The power with which INMARSAT units transmit can overpower the Iridium unit's ability to properly maintain a quality connection with the Iridium satellite constellation. INMARSAT terminals are often found in the same locations as Iridium subscribers, such as harbors, airports and especially onboard ships.

The location of the INMARSAT unit's antenna in relation to the Iridium unit's antenna plays a significant role in determining the degree of signal degradation that an Iridium subscriber can expect to experience. All Iridium units are susceptible to this interference, regardless of the type of antenna being used.

Generally speaking, an Iridium unit, be it a handset using its integral antenna or a fixed terminal when attached to an externally mounted antenna and located within 15 and 45 meters (50 to 150 feet, respectively) of an operating INMARSAT mini-M or Standard-C terminal, will likely experience degraded performance.

Other sources of RF interference such as Globalstar units, radar devices and broadcast stations can provide interference for Iridium units, but usually are not encountered as frequently as INMARSAT terminals.

Symptoms of RF Interference

Symptoms of RF interference often resemble those that arise when an Iridium phone is being operated with an obstructed view of the sky.
Some of these symptoms include; erratic or no signal strength indication, dropped calls or warbled or otherwise distorted voice.

These symptoms may be intermittent or persistent, depending largely on the interference source, its distance, strength and frequency relative to the Iridium unit.

Mitigation of RF Interference

Degradation of service due to RF interference to the Iridium unit can be significantly improved by either or both of the following:

a) Increasing the distance and moving the Iridium antenna off axis from the source of the interference, and
b) b) Using an external band pass filter and an external antenna.

In determining the optimal location for mounting an external Iridium antenna in a location where INMARSAT antennas are also located, be certain that the Iridium antenna is mounted either to the side or behind the INMARSAT antenna, and above or below it.
Also note that the length of the feed line (the cable running from the Iridium unit to the antenna) plays an important role in the performance of the unit.

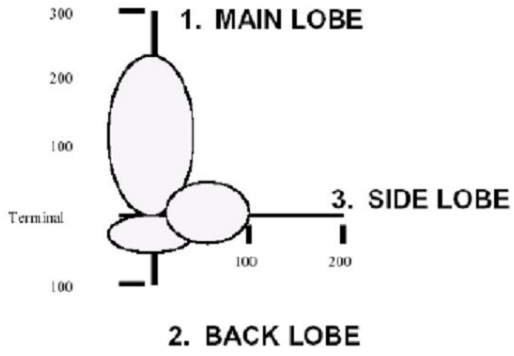
In addition to installing the Iridium antenna off-axis and away from the INMARSAT antenna, installing a band pass filter between the Iridium unit and its external antenna will provide the best protection from RF interference and degraded performance. The use of a band pass filter, which at the present time is designed for fixed installations only, will significantly improve the overall performance of the Iridium terminal.

Recommended Operating Distances:

Inmarsat Mini-M

Recommended Distance Between an Iridium Unit and an Active Inmarsat Mini-M Terminal Antenna

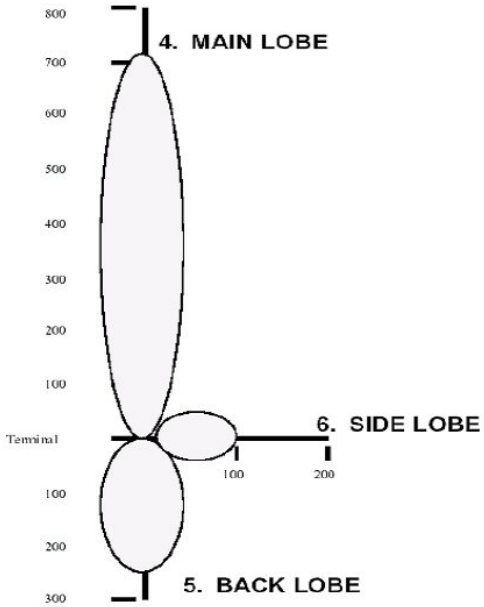
• Main Lobe = directly in front and in line with the Inmarsat terminal antenna:
225 feet (68 meters)
• Side Lobe = directly to the side and in line with the Inmarsat terminal antenna:
100 feet (30 meters)
• Rear Lobe = directly to the rear and in line with the Inmarsat terminal antenna:
50 feet (15 meters)



Inmarsat M-4

Recommended Distance Between an Iridium Unit and an Active Inmarsat M-4 Terminal Antenna

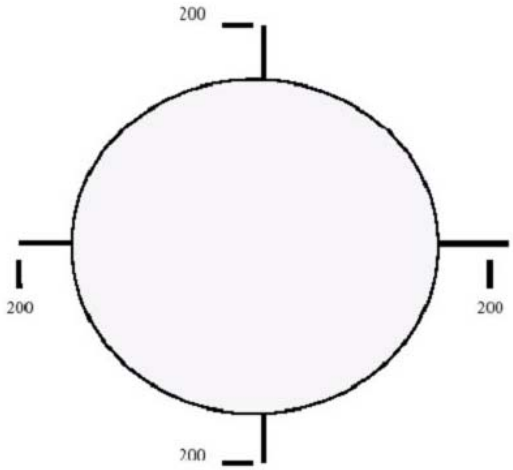
- Main Lobe = directly in front and in line with the Inmarsat terminal antenna:
  715 feet (217 meters)
- Side Lobe = directly to the side and in line with the Inmarsat terminal antenna:
  100 feet (30 meters)
- Rear Lobe = directly to the rear and in line with the Inmarsat terminal antenna:
  250 feet (76 meters)



Inmarsat-C (CAPSAT)

Recommended Distance Between an Iridium Unit and an Active Inmarsat-C (CAPSAT) Terminal Antenna.

- Main Lobe = directly in front and in line with the Inmarsat terminal antenna:
  150 feet (45 meters)
- Side Lobe = directly to the side and in line with the Inmarsat terminal antenna:
  150 feet (45 meters)
- Rear Lobe = directly to the rear and in line with the Inmarsat terminal antenna:
  150 feet (45 meters)



Protection Distances* (ft) *for* Capsat *Terminal

Specification Summary

Electrical	
Power	11-32V DC 2.5A
Plug-pack (if provided)	90-250VAC 50/60Hz input
Power Consumption (Average Current)	Input Voltage 12V 24V
Standby Mode	0.35A 0.16A
Talk/Transmit Mode	0.52A 0.26A
Subscriber Line Interface	
Ring Equivalence Number	3 REN
Impedance	600 Ω or TN12 2-wire interface
Open circuit voltage	-48V DC+- 5%
Ring Voltage	> 56V RMS
EMC Compliance	C-Tick and A-Tick, CE mark,
Environmental	
Operating Temperature Range	0°C to +55°C ambient
Operating Humidity Range	<85% RH non-condensing
Storage temperature	-30C to +70C
Weight	2.5 kg
Dimensions	290x225x60mm

RS232 Specification

The RST-100 is provided with two RS232 serial ports for log and data connection. Both are 9-pin D-type (female) sockets, wired DCE for connection to a standard PC with a 1:1 cable.

Physical Connection

The pin-out of both connectors is described in the following table:

Pin	Signal	Direction	Description
1	DCD	RST PC	Data Carrier Detect
2	RXD	RST PC	Received Data
3	TXD	PC RST	Transmitted Data
4	DTR	PC RST	Date Terminal Ready
5	GND		Signal Ground (Common)
6	DSR	RST PC	Data Set Ready (CTS and DCD)
7	RTS	PC RST	Request to Send
8	CTS	PC RST	Clear to Send
9	RI	RST PC	Ring Indicate (7.5V on Log port)

RS232 Port Signal Support and Handshaking

On the data logging port, DCD and DSR output signals are related to DTR input and CTS is tied to RTS as shown.

The Data port supports full software XON/XOFF handshaking on data (AT commands bypass this as standard for Hayes modems) or full hardware handshaking on RTS/CTS with DCD carrier indication.

The Log port has no software handshaking support and hardware handshaking is loop-back only since the command set requires a minimal buffer.

RS232 Port	
LBT Data Port	**Data Logging Port**
DCD	DCD = DTR
RXD	RXD
TXD	TXD
DTR	DTR
DSR	DSR = DTR
RTS	RTS
CTS	CTS = RTS
RI	RI not connected

RS232 Port Electrical Parameters

The LBT “Comm” Port and Log Ports conform to the RS232 interface specification with the following parameters, however the Log Port communicates only at 9600:

Parameter	Specification
Communication Rate	220 to 115,200 Baud (recommended maximum of 19,200)
Protocol	1 start bit, 8 data bits, no parity, 1 stop bit, asynchronous.
Voltage Levels and Sensitivity	RS232 compliant

RF Interference

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A good example would be onboard a ship. It is important that certain considerations be taken into account for best performance when an Iridium system is installed.
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The location of the INMARSAT unit's antenna in relation to the Iridium unit's antenna plays a significant role in determining the degree of signal degradation that an Iridium subscriber can expect to experience. All Iridium units are susceptible to this interference, regardless of the type of antenna being used.

Generally speaking, an Iridium unit, be it a handset using its integral antenna or a fixed terminal when attached to an externally mounted antenna and located within 15 and 45 meters (50 to 150 feet, respectively) of an operating INMARSAT mini-M or Standard-C terminal, will likely experience degraded performance.

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Also note that the length of the feed line (the cable running from the Iridium unit to the antenna) plays an important role in the performance of the unit.

Inmarsat Interference

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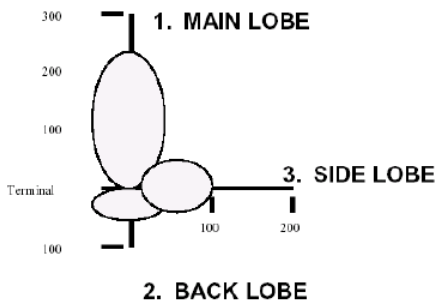
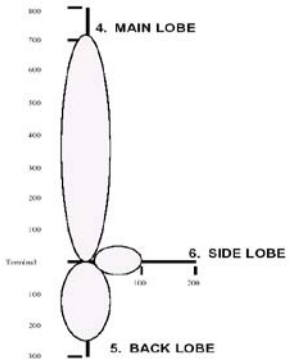


Inmarsat M-4

Recommended Distance Between an Iridium Unit and an Active Inmarsat M-4 Terminal Antenna

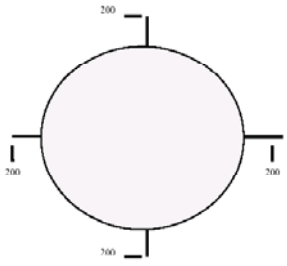
- Main Lobe = directly in front and in line with the Inmarsat terminal antenna: 715 feet (217 meters)
- Side Lobe = directly to the side and in line with the Inmarsat terminal antenna: 100 feet (30 meters)
- Rear Lobe = directly to the rear and in line with the Inmarsat terminal antenna: 250 feet (76 meters)



Inmarsat-C (CAPSAT)

Recommended Distance Between an Iridium Unit and an Active Inmarsat-C (CAPSAT) Terminal Antenna.

- Main Lobe = directly in front and in line with the Inmarsat terminal antenna: 150 feet (45 meters)
- Side Lobe = directly to the side and in line with the Inmarsat terminal antenna: 150 feet (45 meters)
- Rear Lobe = directly to the rear and in line with the Inmarsat terminal antenna: 150 feet (45 meters)



Protection Distances (ft) *for* Capsat *Terminal*

Troubleshooting the RST310

This chapter provides information to help you troubleshoot problems you may encounter while running the RST-100.

Q	No lights on RST310
A	Check power is connected and switched on at the wall.

Q	Low earpiece volume on handsets
A	Ensure the 9505A handheld volume control is set to maximum using the volume buttons on the side of the handset. This should be automatically adjusted during a call to maximum volume.

Q	RST310 fails to register with the Iridium service after 30 seconds
A	Press reset button, ensure 9505A handheld is powered on and cables connected securely to both the terminal and the handset

Q	No dial tone
A	Check if a data call is in progress and power is connected and equipment is in a normal state. Check the 9505A handheld is registered on its screen.

Q	Cannot make call, two tone signal heard
A	Phone requires a PIN or PUK, refer to the handbook

Q	PC cannot connect to RST310
A	Check that the correct cable is used on the correct port, and that the bit rate is set the same for both terminal and RST310

Q	You can't make calls.
A	Check that the antenna is properly mounted. Do you have a clear view of the sky? Did you enter the number in international format? All calls made from the Iridium System require a special calling sequence; please refer to your Service Provider for these details. Check the signal strength meter. If the signal is weak, move the antenna to a more open area. Check the Network Selection settings. Check your Operator coverage map. Is Restricted displayed? Check the Call Barring setting.

Q	You can't receive calls
A	Check to see that your phone is powered on. Check the antenna. Is it properly mounted? Do you have a clear view of the sky? Check the signal strength. If the signal is weak, move the vehicle to a more open area. Check the Call Forwarding and Call Barring settings. Check the Ringer setting. If it is off, there is no audible ringer.

Q	You can't make international calls.
A	Have you included the relevant codes? Press and hold the (+) key to display the international dialling prefix (+), and then enter the appropriate country code, followed by the phone number.

Q	Your PIN is blocked
A	Enter the PIN unblocking key (PUK1) or contact your service provider

Q	Your PIN2 is locked.
A	Enter the PIN2 unblocking key (PUK2) or contact our service provider.

Q	Your SIM card won't work.
A	• Is the card inserted the correct way? • Is the gold chip visibly damaged or scratched? Return the card to your service provider. • Check the SIM and phone contacts. If they are dirty, clean them with an antistatic cloth.

Q	You can't cancel call forwarding or call barring
A	Wait until you are in an area with good network coverage and try again.

Q	The SMS or VMAIL indicator keeps flashing
A	There is not enough memory available to store another message. Or there is a message waiting Use the message menu to read, delete messages and free up some space.

Q	Your terminal has the SIM card inserted but the display says: Enter PUK
A	Enter the PIN unblocking key (PUK1) or contact your service provider

Q	Your PIN is blocked
A	Check Card or Insert Card Check the card is inserted correctly Check the contacts of the card are clean Clean the chip with a soft cloth See your Service Provider if continues